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rocks containing the myriapod, represented in Fig. 4. Copied from Dr. Dawson's figure, greatly magnified.

Fig. 7. *Homothetus fossilis.* A neuropterous insect from the Devonian rocks of New Brunswick; it was discovered by Mr. Hartt.

Fig. 8. *Haplophlebium Barnesii.* A curious neuropterous insect, of large size, probably allied to our May-flies; taken by Mr. Barnes from the coal of Cape Breton.

These figures, with the exception of 1, 4, and 6, are of life size, and borrowed from the new edition of Dr. Dawson's Acadian Geology.

THE HAND AS AN UNRULY MEMBER.

BY BURT G. WILDER, M. D.

(Concluded from page 491.)

Fracture or Crossing. This is the name given to a view of the limbs, which, under various modifications, has been entertained by four celebrated anatomists, Bourgery, Cruveilhier, Flourens, and Owen. Its essential feature is the pronation of the forearm so as to bring the thumb on the inner side, opposite the great toe; but this has the effect of crossing the radius upon the ulna, so that its upper end is to the outer, while its lower end is to the inner side of that bone. This condition of things, though contrary to the relation of the corresponding parts in the leg, is accepted by Owen* and Flourens, who simply seek to show that the front of the arm really corresponds to the front of the leg, and *vice versa*, so that the concavity of the elbow is made to represent the convexity of the knee; but the other two anatomists try to explain the crossing of the bones, upon an idea which was distinctly enunciated by Cruveilhier, in the following propositions:

"1. Neither bone of the leg is represented by a single bone of the arm.

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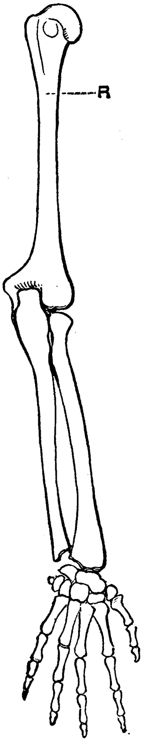
*Comparative Anatomy of Vertebrates, ii. 310, 360.

"2. In each bone of the leg we find characters which belong, partly to the ulna, and partly to the radius."

The practical result of this view is to cut the two bones across the middle, and reunite the upper half of the one with the lower half of the other; a convenient and ingenious, but unjustifiable mode of procedure.

Fig. 1.



Torsion. This last of the three principal theories adopted, or rather invented, in support of the idea of parallelism, was first proposed by Maclise, in 1849. Like all the rest, he assumes that the thumb corresponds with the great toe; that the hand points forward like the foot, and that the limbs are, or ought to be, parallel: but he saw that his predecessors had been unable to fulfil these three conditions without pronating the hand, and so crossing the radius upon the ulna, which crossing he could not reconcile with the fact, that the corresponding bones in the leg (Plate 12, fig. 1)* were parallel with each other. He then perceives that the *front* of the forearm really corresponds with the *back* of the leg, and *vice versa;* whereas, according to the idea of parallelism, the front of the one ought to correspond with the front of the other, as believed by Owen and Flourens. To reconcile this new fact with the old theories, he reminds us that "anatomists have long since remarked upon the singular *twisted* form of the humerus," and then says, "this

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*Fig. 1. The right arm as it appears after having been *untwisted*, as proposed by Maclise and Martins. The bend of the elbow is brought to the front, and the two bones of the forearm are parallel. This is in the effort to bring corresponding points of the two limbs to face in the *same* direction. Compare with Plate 12, Fig. 1. The real *symmetrical* view of the limbs requires simply that the forearm be *supinated*, and the thumb left on the outer side like the little toe.

fact of torsion in the shaft of the humerus I consider as fully explaining the above-mentioned peculiarities which distinguish the upper from the lower member; while (in idea) I untwist the humerus by bringing its back to the front, I at the same time unravel the gordian knot of that problem which has so long existed as a mystery for the homologist."

But, before accepting this ingenious solution of the problem, you may be inclined to ask how it is, that, if the humerus is really twisted, anatomists have never observed and described the various stages of the operation, instead of simply commenting upon the *twisted appearance* of the bone. This very reasonable question is thus answered by a French anatomist, Martins, who in 1857, and apparently unacquainted with the views of Maclise, proposed this very same theory of torsion.

Martins admits as a "metaphysical difficulty," the fact that the humerus *never undergoes* the actual operation of twisting at all, and that in the earlier stages of growth *not the slightest traces of torsion exist;* but asserts, nevertheless, that "a *virtual* torsion does take place during growth, and that this produces the same effects as if it were real." The chief indication of this is the raised line for the attachment of muscles, which runs obliquely upward, from the outer side of the lower end of the humerus, and is lost upon the posterior surface, giving to the lower part of the bone the *appearance* of having been twisted. But it may be seen that the posterior surface of the thigh bone presents a similar raised line, even more strongly marked, so that there is quite as much reason for untwisting that bone, which would leave matters relatively just as unconformable as at first; and it is well known that both these lines are solely for the attachment of muscles, that they do not exist in young or feeble individuals, and that in some animals, as in the ant-eater, and even in the horse, they form prominent ridges which can never be accounted for by any twisting of the bones.

There is really a fourth theory of parallelism, modifications of which are entertained by three eminent English anatomists,* and which is, in many respects, the most plausible and the most difficult to refute. According to this view the limbs are supposed to stand out at right angles from the side of the body, the elbow being moved forward and outward, and the knee backward and outward into a position which nearly corresponds with the condition of the limb in many reptiles, and also in the early stages of growth of the higher animals; and in view of the great weight which is now deservedly attached to the facts of embryology, it will be evident that such a view must not be rejected without very good reasons. It will be noticed, too, that this view does little violence to the limbs, although the limbs of mammalia would be placed in rather uncomfortable positions, in order to conform to it. I feel sure, nevertheless, in spite of the apparently natural arguments, and in all deference to its distinguished advocates, that it is based upon a partial consideration of the subject, and I wish that it were possible in this connection to offer my reasons for dissenting therefrom. But it involves so much, and would require a discussion of so many still controverted points, that I should be obliged to present in full the grounds upon which my own opinion is founded, which would far exceed the limits of an article like this.†

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*Huxley, Mivart, and Cleland, before cited.

†Those of my readers who care to learn the views of the anatomists who believe in a symmetrical or antagonistic relation of the limbs are referred to the works of the "Oppositists," already cited in the preceding number, and the following papers by the writer: On Morphology and Teleology, June 3, 1866, Memoirs Boston

And to do this was by no means my object, but simply to give an idea of the trouble which has been given philosophical anatomists by the hand; for, as has been shown, the hand suggests an idea of parallelism which it is very difficult to overlook, so that the majority of those who have treated this subject, have made more or less ingenious attempts to apply the same principle to the upper portions of the limbs.

These various attempts have been briefly, though I think fairly stated. What seem to me their fallacies have been brought more prominently into view and criticised as severely as possible, partly on the abstract ground that a great step in our investigation of truth is the full recognition and rejection of error; and partly, in accordance with the purpose of this paper, to show what strange and widely diverse opinions have been entertained by those who have regarded the Hand in its ordinary position, and with the common estimation of its value.

The space allotted to me will permit only the briefest presentation of the grounds upon which is based the other view, that, namely, of a symmetrical or antagonistic relation between the fore and hind limbs; the principal point is, that instead of beginning with the *hand*, and forcing the rest of the limb to conform to it, we should recognize that the hand is a peripheral organ and subject to variation;* and that its morphological value is by no means equal to its teleological or functional value; and that, finally, the attitude which it has in most animals is

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Soc. Nat. Hist., Vol. I. No. 1; On a Cat with supernumerary digits, Proc. Boston Soc. Nat. History, May 16, 1866; and on the Morphological value and relation of the Hand (Abstract of a paper read before the National Academy of Sciences, August 8, 1866), American Jour. of Sciences and Arts, July, 1867.

*No one, so far as I know, has recognized this inverse ratio between the morphological and teleological values of organs. And yet its non-recognition seems to me not only to have blinded the eyes of the Parallelists to the idea of symmetry which underlies the antagonistic relation of the proximal segments of the limbs, but also to have prevented most of the Oppositists from carrying out this idea beyond the elbow.

in consequence of the necessity for the extremities of both pair of limbs to strike the ground so as to propel the body in the *same* direction : but if we begin with the upper parts of the limbs, we shall perceive an idea of *antagonism* which may be easily traced in the hands when they are put in what may be termed their *normal position* (Fig. 2) ;* and although this brings the thumb on the outer side, and thus opposite the little toe, yet if we recollect that in most animals the thumb is rather *smaller* than the other digits, instead of larger as in man, and that therefore its assumed superiority is really confined within a very narrow limit, we may conclude, when the question comes, Shall the thumb force the arm and the forearm into parallelism, or shall it conform to the idea of antagonism which they suggest, that the latter is the fairer and more philosophical view of the matter.

It sums up thus. Begin your studies of the limbs at the periphery, with the hands and the feet, and assume a correspondence of thumb and great toe, you will then see an apparent parallelism as to the extent of which no two investigators can agree, and by which they have been led to twist, to fracture, and to dislocate the limbs in a manner most unjustifiable; and to regard the body as a structure with but one end and no centre, a geometrical absurdity.

But commence at the centre, at the middle of the vertebral column, and regard the body as having not only two *sides* but two *ends*, antagonistic in position and in function; then you will see that the limbs which are given off from the two poles of this longitudinal axis, are like-

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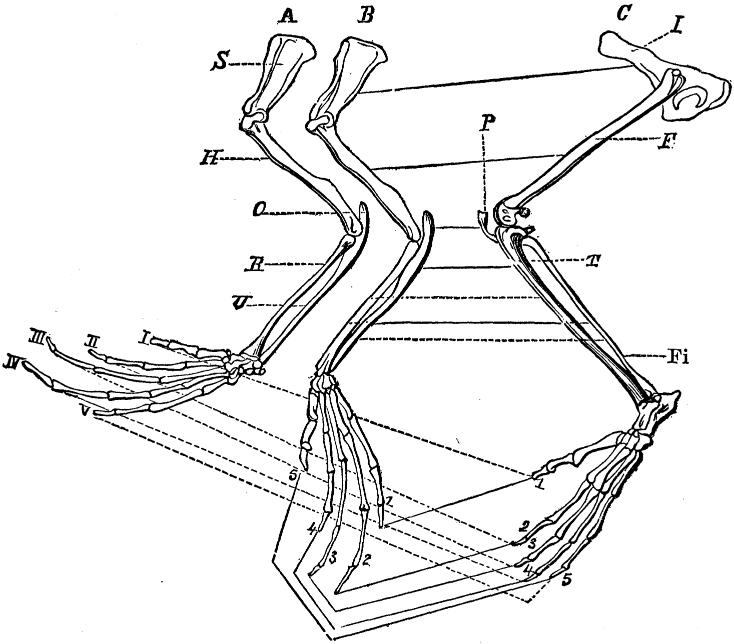
*Those of my readers who are unwilling to compare the fore and hind limbs in any other than a *natural attitude*, are reminded that there is no one natural attitude common to all vertebrates, or even to all mammalia, and are referred to what has been said upon the normal position of animals by Professor Agassiz. Contributions to the Natural History of the United States, vol. iii. p. 76.

wise antagonistic in every part but the terminal segments, while even these disagree only in what is the natural attitude of the hand in the forward moving animal, and come into a proper antagonistic relation in what may be con-

Fig. 2.



Limbs of left side of Aye-aye (*Cheiromys Madagascariensis* Cuvier), altered from Owen.* (By permission from American Journal of Science and Arts, July, 1867.) *A*, Foreleg in its *natural attitude*, the hand being more or less pronated, so as to bring the thumb (1) upon the inner border of the limb, and cross the radius upon the ulna. *C*, Hind-leg. *B*, foreleg in its *normal position*, the hand being supinated so as to bring the thumb (5) on the outer side, and opposite the little toe (5). The radius *R* is now wholly on the outer side of the ulna (*U*), and the fingers point backward, as the toes point forward. All the parts are now symmetrical with those of the hind-leg, and the parts thus *symmetrically homologous*, are joined by continuous lines; but the parts which are only *analogous* in the natural attitude of the foreleg, are joined by dotted lines. *S*, Scapula; *I*, Ilium; *H*, Humerus; *F*, Femur; *O*, Olecranon process; *P*, Patella; *U*, Ulna; *T*, Tibia; *R*, Radius; *Fi*, Fibula. The *homologous* digits of *B* and *C* are numbered 1, 2, 3, 4, 5, starting from the so-called little finger and great toe. The Roman numerals attached to the digits of *A* indicate their *analogies* with those of *C*.

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* Monograph of the Aye-aye, Plate 7. Also, Comparative Anatomy and Physiology of Vertebrates, Vol. II. Fig. 343.

sidered its normal position. To all this, the thumb is the only objector; but mighty as that is in all matters of common life, you must already have perceived, by a kind of "reductio ad absurdum," that the less it, and, indeed, the whole hand are regarded in our morphological comparison, the less liable shall we be to fall into such extraordinary and fantastic notions as some of those we have been considering. Fortunately, however, man can but interpret Nature; he cannot change her. His errors die with his interpretation, while the facts belong to God, and are safe from the interference of man.

THE SOUTHERN MUSCADINE GRAPE.

BY D. H. JACQUES.

Climbing the tallest trees, covering and almost smothering the smaller undergrowth, hanging over rail fences, hiding pine stumps and brush-heaps, or, for want of other support, trailing on the ground, one may see almost everywhere in the South, from the seaboard of Georgia and Florida to the mountain slopes of North Carolina, the graceful vines of the Southern Muscadine, and, in its season, the ripened fruit, with which many of these vines are laden, will allure the traveller at every turn from the dusty road. Few who have once eaten this fruit, in its perfection, will be able to resist the temptation to dismount and eat the tempting clusters.

As this grape is not found (I believe) north of the southern slopes of the Alleghany Mountains, and is little known, and often erroneously described, a brief notice of it may not be out of place.